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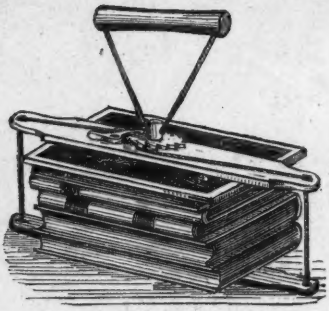

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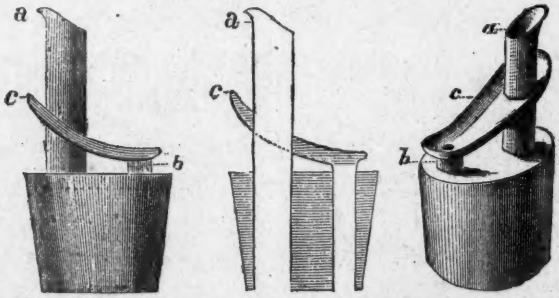

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AMERICAN
EDUCATIONAL MONTHLY.

VOL. IV. MAY, 1867. No. 5.

THE INSTRUCTION OF THE PEOPLE IN THE NINETEENTH CENTURY.

By ÉMILE DE LAVELEYE, in Revue des Deux Mondes.

I.—POPULAR EDUCATION IN AMERICAN SCHOOLS.

MORE attention is now paid to the education of the masses than at any previous time, not only in Europe, but throughout the world. In France, M. Duruy, minister of public instruction, has lately made a report in which he exposed with commendable frankness the condition of elementary education, and urged the necessity of thorough reforms. M. Natoli, minister of public instruction in Italy, has also had the courage to show, in documents submitted this very year [1866] to Parliament, what remains to be done to dispel the ignorance that rests upon the inhabitants of that country. England, displeased and mortified at the slow progress of her schools, orders repeated investigations, and endeavors, without much success hitherto, to improve a system whose too evident imperfection is plainly recognized. Portugal tries a new system into which modern ideas have been introduced; and Russia, in the midst of her social and political difficulties, finds time to consider the subject and devise improvement. In Holland, in Belgium, this problem continually occupies the public mind. In short, in Australia and in Canada, in Chili and in Brazil, in countries of Latin origin no less than in those of Anglo-Saxon, thoughtful attention is bestowed upon this subject. Everywhere the means of diffusing intelligence, of making education accessible to all, obligatory upon all, are sought; efforts are made to perfect methods, normal schools are organized, school houses are multiplied, the position of instructor is held in higher esteem, and there is hardly any disposition to shrink from the pecuniary sacrifices demanded by these improvements.

In fact one must be blind not to see that the future of nations depends upon their intelligence. Many reasons might be adduced to prove this. I will mention but three. Bacon's admirable saying, "Knowledge is power," is well known. Nothing is truer, especially from an economical point of view. It is the knowledge of natural laws that renders labor productive. The savage with acute senses, and a body inured to all kinds

of fatigue, lives in misery and often dies of want. He is unacquainted with the forces of nature, and they prove too strong for him. The civilized man, after five thousand years of study and discovery, has penetrated their secret: he makes them his servants, and henceforth, with lightened labor, he reigns over conquered matter in the midst of plenty. In future the richest nation, and consequently the most powerful, will be that which shall apply the most knowledge to labor.

While education is indispensable to the increase of wealth, it is no less needed to teach its proper use. Hardly anywhere are the wages of the workman sufficient to satisfy his reasonable wants, and yet what a large portion does he devote to useless or even injurious objects. Incapable of foresight, his views limited to the present, he does not appreciate the value of economy. Fond of excessive and sensual excitement, he too often finds pleasure only in intoxication, and, if he earned more, he would only drink the more. He must acquire by education a taste for intellectual enjoyments before an increase of wages will really improve his condition. A nation must be intelligent to produce largely and dispose wisely of these multiplied productions. The historian, Macaulay, remarks that if in the eighteenth century Scotland, lately poor and ignorant, excelled the English in all departments, this superiority resulted from the fact that the Parliament at Edinburgh had given to Scotland a system of national education which was wanting in England. In the United States, manufacturers say that if they can compete with Europe, although they have to pay twice as high wages, it is because their workmen, being better educated, work faster and better, and know how to make more use of machinery.

To this economical reason is added a second, derived from political considerations. Democracy is gaining ground, it is often repeated, by the friends of freedom with joy, by its foes with alarm. Equality is making progress in monarchies as well as in republics, in Russia no less than in Switzerland. The result is that either by revolutions or reforms the number of those who by their votes have a share in the government of their country, is continually increasing. Already universal suffrage has been established by several nations. Almost everywhere the impatient masses are demanding the ballot, and even aristocratic England is preparing to grant it. This democratic movement depends upon causes so profound and so general that no sovereign, no party, no coalition, can arrest it. We must then make the best of it, and to this end each extension of suffrage should be the consequence of an advance in public intelligence; men should administer the affairs of society only when they are capable of wisely managing their own. Give the ballot to an ignorant nation, and anarchy will result to-day, despotism to-morrow. An enlightened nation, on the contrary, will soon be a free nation, and will preserve its liberty by knowing how to use it. True freedom is insured by education reaching

even to the remotest cottage of the remotest hamlet. Preceded or closely followed by the diffusion of education, universal suffrage is the exercise of a right, and a sure source of strength and greatness; accompanied with persistent ignorance, it may be the source of incalculable evils.

I will add a final consideration. A great danger may threaten modern civilization. If, at the same time, that a general desire for improving their condition pervades the people, intelligence and morality are diffused among all classes, so as to inspire justice on the one hand, and on the other the patience required by peaceful reforms, steady progress is insured; but if we maintain education, wealth and selfishness in the upper classes, ignorance, poverty and envy in the lower, we must expect bloody revolutions.

What has just been said may seem common-place, for scarcely any one now boasts the advantages of ignorance. Ministers and deputies, books and journals, proclaim with one accord the absolute necessity of education; but it is doubtful whether men's minds are prepared to meet the necessary sacrifices to accomplish the work. That we may not deceive ourselves in this matter, it is profitable to study the methods adopted by those nations that have most nearly approached the end in view. A single example will show at what cost education has been diffused among a people.

There are, I think, four nations that can say with laudable pride that all their citizens can read. North Germany, Norway, Switzerland, and the United States, but only in the one last named does every one read for information, for diversion, to become acquainted with public affairs, to find out how to conduct business better and earn more money, or to learn more concerning the great truths of religion.

There is twice as much printing there as elsewhere, and the Union alone consumes as much paper as France and England together. According to statistics, the number of subscriptions to journals divided by the number of inhabitants gives more than one subscription to a family. Daily papers are issued by the hundred thousand copies, and some weeklies have a circulation of four hundred thousand. All travelers who visit America are impressed with the fact that everybody—the common people as well as others—is occupied in reading. In the spring of this year I visited the noble federal frigate, the *Niagara*, which lay at anchor in the harbor of Antwerp. Every sailor who was not on duty had a book, a magazine, or a journal in his hand. In Europe on leaving school, or when a young man enters the army, the statement is made that he can or cannot read a few lines; but this superficial knowledge of the printed letter is generally of little advantage to him: he does not use it. In America reading is a daily habit, the source of public prosperity, and the essential condition of the permanence of republican institutions.

The common school, all Americans confess, is the foundation of the state—the true bond of the Union. Free to all, open to all, receiving

the children of all classes and all faiths, it obliterates social distinctions, softens religious animosities, eradicates prejudices and antipathies, and inspires each heart with a love for the common country, and a regard for free institutions. It is amazing to see the mass of foreigners annually introduced by emigration so soon absorbed into the American nationality. It is the school which, from the first generation, imprints upon them the seal of the national manners, imparts to them the prevailing ideas, and renders them capable of exercising a citizen's rights. Without the school the Union would long ago have ceased to exist, rent by factions, ingulfed beneath the waves of ignorance continually flowing into it from Germany and especially from Ireland. Recent calculations show that if all immigration had ceased in 1810, the free population of the United States, instead of amounting in January, 1864, to 29,902,000, would have reached only ten and a half millions. The immigrants and their descendants constitute then two-thirds of the population. It is due to education that this primitive stock, so inferior in number to the foreign element, has been able to assimilate them and communicate to them the peculiar characteristics that distinguish the old Anglo-Saxon and Puritan race.

How often during the late civil war was it predicted that the West would separate from the Atlantic States, and that California would form an independent republic on the shores of the Pacific! In fact, the friends of the North were not without fear of this result. Those distant states might have deemed it an easy way of escaping the fearful sacrifice of blood and treasure demanded by the war; but they did not even think of it. The schoolmasters, either natives of New England or imbued with her spirit, had already awakened the sentiment of nationality in these newly-settled communities, and the school was the strong bond that held together all the parts of the stately structure. Europe has justly admired the energy of this young nation which in four years could furnish, in defence of a just cause, two million men and four billion dollars. It is an unexampled proof of power and wealth; but it is still more remarkable and commendable that this nation, in the midst of heavy taxes to which it was wholly unaccustomed, has supported a government demanding these sacrifices which only victory could justify. It is an indication of great wisdom and foresight of which an ignorant nation would be incapable. The school proved the salvation of American democracy.

THE power to please is always grateful; and nothing can afford a human being purer, richer, more refined and satisfactory enjoyment, than the power of making children happy.

EARTHQUAKES.

FRAGMENTARY accounts of earthquakes occurring between 1700 and 100 B. C., are occasionally met in ancient writings, but the first that is reliable is respecting a convulsion in Palestine, about thirty-three years B. C., by which thirty thousand persons were killed. From that time the records are confused until the fifth century A.D., when the whole of the civilized world was severely visited, and many portions of Western Asia were desolated. In the sixth century, the Japanese province of Josa was scourged by a fearful earthquake, causing great destruction of life, and the loss of five hundred thousand acres of land which sank into the sea. The ninth century was remarkable for the extent and frequency of these convulsions. France was shaken severely, and afterwards wasted by pestilence; in Antioch fifteen hundred houses were thrown down; one of the mouths of the Rhine was suddenly closed, and an earthquake in India destroyed 180,000 lives. This last was preceded by showers of meteoric stones, and was followed by furious storms. From the ninth century until the seventeenth, few earthquakes occurred. In the latter century, they were numerous and severe. The Neapolitan territory was dreadfully tossed: thirty towns and villages were destroyed, and seventeen thousand persons killed. Toward the end of the same century this territory was again visited. In Sicily alone forty-nine towns were overturned, and ninety-two thousand persons perished. England was convulsed several times. In 1692, the island of Jamaica exhibited a remarkable phenomenon. The whole island rose in waves several times, and finally sank permanently below its former level. Three thousand persons perished, and one thousand acres of land disappeared beneath the water. At Port Royal, a tract of land subsided forty-eight feet below low-water mark. Submerged houses, according to Sir Charles Hamilton, were visible during clear weather in 1780, nearly ninety years afterwards. In the Sicilian earthquake of the same year several thousand people were entombed in the ruins of caverns in limestone at Sortino Vecchio; and at the same time, a large stream which for ages had issued from one of the grottos below that town, suddenly changed its subterranean course, and came out from a cave lower down in the valley whence no water had previously flowed.

The most extensive earthquake of modern times began at Lisbon on November 1st, 1755. Its effect was most visible in the Peninsula and Northern Africa, but at the same time it was perceptible over the whole of Europe, in the West Indies, and in America as far north as the great lakes,—an area of at least 7,500,000 sq. miles. If the action attained a depth of twenty miles, the mass in motion must have been 150,000,000 cubic miles. Many strange meteorological phenomena are recorded as

having been observed throughout Spain and Portugal during the month preceding the earthquake : halos round the sun and moon ; fiery meteors, and alterations in well and river water, which generally acquired an offensive odor. Violent thunder, lightning, and rain, are also reported as having occurred in almost all parts of Europe. These phenomena were most remarkable in Spain where well-water was discolored, rats and reptiles came from their holes terrified, and domestic animals were frightened and uneasy.

The earthquake began at Lisbon at 9.38 A.M. A sound of subterranean thunder was heard, and immediately a violent shock overthrew the greater part of the city. Other shocks followed with great rapidity, and in six minutes sixty thousand persons had lost their lives. A Mr. Latham, of London, who was at that time in Lisbon, writes that he felt the earthquake while on the water. He hastened ashore and ascended a hill, whence he saw the sea, which had previously receded, come rolling in, in a vast wave fifty or sixty feet high, and sweeping everything before it. Several thousand persons had taken refuge on a great stone quay recently finished. In an instant it was overturned, and more than six thousand men and women, with the ships that were attached to it, were engulfed in the waters. Not a dead body, not a spar ever floated to the surface. Where the quay stood the water is now six hundred feet deep. At the same time a religious festival was in progress at Lisbon, and many thousands were crushed to death by the falling churches. Fires broke out all over the city, and that nothing might be wanting to complete the desolation, bands of robbers roamed among the ruins, plundering, burning and murdering.

Near Morocco eight thousand people were swallowed up in a huge opening. In Milan the lamps were violently shaken and church bells rang. In Sweden and Norway a wave broke upon the coast, and a slight shock followed which moved the furniture in houses. In the Pyrenees, springs were affected and many wells became salt. Every lake in England and Scotland was for a moment thrown from its bed. The huge wave which desolated the coast of Spain and Portugal, swept across the Atlantic and dashed against the West Indies. It rose and fell eighteen times at Tangier, and was fifteen feet high at Madeira. The shocks were felt even in mid-ocean. Off St. Lucar the ship *Nancy* was shaken ; a vessel from Denia was so severely strained that the seams opened, and the compass was overturned in the binnacle. Another, forty leagues west of St. Vincent, experienced so violent a concussion that the men were thrown eighteen inches from the deck. The motion of this earthquake was wave-like, and at the rate of twenty miles a minute.

Many earthquakes followed in Europe during the eighteenth century. The most important was that of Calabria, which began in 1783 and continued with slight interruptions until 1786. This was the first earthquake

whose phenomena were accurately observed and recorded by competent persons. Of the many convulsions during the last four or five centuries this is almost the only one of which such an account exists as to enable the geologist to appreciate the changes which this cause can produce in the lapse of ages. During 1783, there were nine hundred and forty-nine shocks, and in the following year one hundred and fifty-one. The area over which shocks occurred so forcibly as to cause alarm was small, covering not more than five hundred square miles, though the concussion was perceptible throughout Sicily, and as far north as Naples. The first shock was especially severe in the lowlands, and in two minutes overthrew nearly all the cities in Calabria Ultra, on the western side of the Appenines. The surface of the ground heaved and tossed like waves on the sea. In subsequent shocks, trees sometimes bent so as to touch the ground with their tops ; at Terranuova a stone well in the convent of the Augustines was driven out of the earth and stood like a tower somewhat inclined : the stones in two obelisks at the Convent of St. Bruno were dislocated and turned on their pedestals : great ravines were formed, one, a mile long and thirty feet deep ; new lakes appeared, heavy masses of rock bounded into the air, and in some towns pavements were overturned ; two mountains were moved toward each other until they met and interrupted the course of a river ; land-slides were frequent ; near Seminara an extensive olive-yard and orchard were thrown unbroken two hundred feet into a ravine sixty feet deep, where in the same year they bore fruit ; a great part of the town of Polistena was transported across a ravine ; a district one mile long and half a mile broad was carried a mile down a valley without overturning the houses and trees upon it. The number of those who perished during this earthquake is estimated by Hamilton at forty thousand, and twenty thousand more are supposed to have lost their lives by the epidemics which followed.

Like southern Europe, the western coast of South America is ever liable to earthquakes. In 1797 the territory of Quito was desolated, and forty thousand persons were destroyed. On the 19th November, 1822, the coast of Chili was visited by the most tremendous earthquake on record. The shock was simultaneous through twelve hundred miles of sea-coast, north and south : and an examination of the country about Valparaiso showed an elevation of the land for one hundred miles. At that city the rise was three feet ; in the interior it was much greater. The area over which this permanent elevation occurred is one hundred thousand square miles. If the elevation was only three feet, the mass permanently added to continent was fifty-seven cubic miles ; in weight, one hundred thousand times as great as that of the largest pyramid. The volcanic forces had however to overcome a greater resistance than this. Supposing the whole thickness of rock on the coast to be only two

miles, the mass which changed place and rose three feet must have equalled in weight three hundred and sixty-three millions of pyramids. In 1835 the Chilian coast was visited by an earthquake of greater violence than that of 1822, though its effect was perceptible over a smaller space. A portion of the coast was raised five feet, but afterwards receded three. The island of Santa Maria was permanently raised about ten feet, and soundings round it show a decrease in depth of one fathom and a half. North of Concepcion, on the continent, no elevation could be ascertained.

Though our country is in the main comparatively free from earthquakes, it is not altogether untouched, and slight shocks are not unfrequent, especially on the western coast. In 1811 South Carolina and the Mississippi Valley were convulsed. In the latter a tract, many miles in extent, was covered with water, which afterwards disappeared and left instead a stratum of sand; large lakes were formed in an hour, and others were as rapidly drained; the grave-yard at New Madrid was tumbled into the river: the site of that city and the river bank for fifteen miles above permanently subsided eight feet. Long states that a neighboring forest presented a singular scene of confusion for many years: the trees stood inclined in every direction, and many had their trunks and branches broken. During the earthquake the ground rose and fell in great undulations, which, when they rose to a considerable height, frequently burst and threw out jets of water, sand, and pit-coal, as high as the tree tops. The chasms extended northeast and southwest. At one time the ground below New Madrid so rose as to dam up the Mississippi, and to cause a temporary reflux of the water. In 1843 and 1857 the Valley was again convulsed.

During the autumn of 1857 warnings of coming disaster were general throughout the Kingdom of Naples. Wells dried up; streams gave forth a fetid odor, and attained a boiling temperature; the atmosphere was calm, and a misty light was frequently seen where afterward shocks were most violent. On the 7th of December a shock overthrew the cone of Vesuvius. On the 16th at midnight, Naples was shaken: furniture, then walls, then whole houses rocked. The population rushed into the streets for safety, but were immediately dashed against the houses by the return wave. On that night Vesuvius broke forth, and for several days was in fierce action, many new vents having been opened. Naples escaped with a good shaking, and no lives were lost. In other parts of the kingdom the influence of Vesuvius was unfelt, and the effects were more disastrous. Throughout the provinces the destruction of life was awful. In some cities not a house remained inhabitable. So sudden were the shocks that few persons could escape from their houses, and many were buried in the ruins. Saponara, a town with 8,000 inhabitants, was absolutely reduced to powder. At Padula a large stone statue of the Virgin was turned on its pedestal; extensive land slides occurred, and in some cases roads were

moved hundreds of feet from their original situations; on the water vessels experienced severe shocks, and some mariners felt as though they were in the vortex of a whirlpool. This earthquake was felt but slightly beyond the Neapolitan territory. It destroyed 30,000 persons, and many were injured by being buried under the ruins. Happening as it did in midwinter, sickness and want followed, by which great numbers perished.

CAUSES OF EARTHQUAKES.

Hypotheses for the explanation of seismic phenomena are almost as numerous as investigators, but all may be regarded as modifications of two leading theories. Of these, one, supported by Dana and Perrey, asserts that the surface of the earth is a mere crust of moderate thickness, resting upon a central ocean of fused matter, and refers earthquakes and volcanic eruptions to the movements of this internal ocean; the other, maintained by Lyell, denies the existence of a molten interior, and regards all the phenomena as the results of chemical action. According to this theory, the solid, fluid and gaseous compounds composing the earth are constantly being resolved into their elements, which immediately enter into new combinations. These processes are not confined to the surface, but go on in the bowels of the earth, and are generally accompanied by evolution of heat and electricity. It is known that various mixtures when buried in the earth, with access to water, readily combine or decompose with evolution of great heat. Thus a mixture of sulphur and iron, when buried, soon becomes warm and swells so as to raise the ground, emitting sulphurous vapors, and forming a miniature volcano. When explosion occurs the fire is vivid, and of long continuance. Pyrites frequently cause spontaneous combustion in heaps of bituminous shales, thrown into damp places.

Sir Humphrey Davy, after his discovery of the alkaline metals, imagined that these abound in an unoxidized state in the subterranean regions to which water occasionally penetrates. When thus reached by water the metals combine with its oxygen and the hydrogen is set free, sufficient heat being produced to melt the surrounding rocks. The hydrogen thus freed is stored away, perhaps in a liquid state, to become a powerful agent in altering the crust of the earth, and again in turn to act as the de-oxidizer of the alkalies previously formed. Here then is a grand field for chemical action. Combination and decomposition must continually go on in alternation. Electricity doubtless would assist in the latter. That it does so is rendered highly probable by the facts that almost invariably vivid lightnings are seen in the clouds of vapor ascending during volcanic eruptions, and that during earthquakes there is usually great magnetic disturbance.

The recently published works of Mayer, Tyndall, and Ennis* have so

* Mayer: "Celestial Dynamics." Tyndall: "Heat as a Mode of Motion." Ennis: "Origin of the Stars."

explained the theory of a central ocean of fused matter, and its bearings upon seismic phenomena, that we need not enlarge upon it here. We will refer only to the researches of Prof. Alexis Perrey, of Dijon, France. From the analysis of various catalogues to which he had access, he concludes that earthquakes occur more frequently at the periods of new and full moon; that their frequency increases at the perigee and diminishes at the apogee of the moon; that shocks of earthquakes are more frequent when the moon is near the meridian than when ninety degrees away from it. These deductions point to the existence of a terrestrial as well as an oceanic tide. The novelty of the theory led this French Academy to appoint a commission to examine it. Their report was favorable, and they explain Professor Perrey's views thus :—If, as is generally believed in the present day, the interior of the earth is, owing to its high temperature, in a liquid or melted state, and if the globe has but a comparatively thin solid crust, the interior, being deprived of solidity, is compelled to yield, like the superficial mass of the ocean waters, to the attractive force exercised by the sun and moon, and it acquires a tendency to swell out in the direction of the rays of these two bodies; but this tendency meets with a resistance in the rigidity of the solid crust, which occasions shocks and fractures of the latter. The intensity of this force varies, like the tides, according to the relative position of the sun and moon, and consequently according to the moon's age; and we must also observe that as the tides ebb and flow twice in the course of a lunar day, at those hours which agree with the passing of the moon over the meridian, so the direction of the attraction exercised upon a point of the interior globe must change twice a day, according as the point recedes or approaches the meridian the plane of which passes through the centre of the moon. Without entering into further details, we can easily conceive that if the fusion of the interior mass of the globe plays a part among the causes of earthquakes, then its influence may become evident by a necessary connection, capable of observation, between the occurrence of earthquakes and the circumstances which modify the moon's action upon the entire globe, or upon a portion of it—namely, its angular distance from the sun, its real distance from the earth, and its angular distance from the meridian of the place, or, in other words, the moon's age, the time of perihelion, and the hour of the lunar day.

Should such a connection between the occurrence of earthquakes and the circumstances which modify the action of the moon upon the earth be fully substantiated, it would not prove the entire fusion of the interior mass of the earth. There may be, as many supporters of the opposite theory hold, seas of molten matter, beneath the surface, sufficiently extensive to be affected by tides great enough to produce observed seismic phenomena, and yet constituting relatively but a small portion of the entire globe.

ISOMETRIC DRAWING.

Chapter II.—Lesson VI.

BEFORE commencing the work of this chapter it will be well to review the directions given in the second lesson, upon the use of the rulers. You will no longer have the outline of the cube to aid you in making the measurements, so you must be careful in measuring the lines of your drawing, and also in drawing parallels by the rulers.

The subject of this lesson is the complete figure No. 37. It represents a base, a standard, and a cap. The standard is on the middle of the base, and the cap projects equally on all sides.

It is better for many reasons to commence the drawing with the base. Draw as in Fig. 32, first the horizontal line parallel to the bottom of the paper; then the lines A E and A K precisely as in drawing the cube. These lines are each three-quarters of an inch. Draw A L one-quarter of an inch; also verticals at E and K of the same length. From L draw lines parallel to A E and A K, and of the same length; they will just reach to the verticals already drawn. Now by careful use of the rulers, draw the two remaining lines parallel to A E and A K, meeting at H. Measure the four sides to see if they are equal.

Now to draw the standard upon the middle of the base, we must first find the position of the little square that it stands upon. Two different ways of doing this are represented in Figures 32 and 33.

First draw, as in Fig. 32, diagonal lines across the top of the base They intersect each other at the centre of the figure. Measure from the centre towards L a distance equal to one-half the width of the standard. In Fig. 32 it is one-eighth of an inch, and the measurement gives the point T.

Now beginning at T, draw T N, T V, V X and N X parallel to the corresponding sides of the base. This method of finding the corner T is of use only when the four sides of the base are equal, that is, when it represents a square.

The other method, shown in Fig. 33, may be employed when the base is longer in one direction than the other. Find out how far the standard is to be from the edge of the base. As the base in this example is three-quarters of an inch wide, there will be just one-quarter of an inch on each side from the foot of the standard to the edge of the base; you must therefore measure from L a quarter of an inch each way to Z and to W. Now if lines be drawn from these points across the figure parallel to the sides, they will intersect at T, which is the corner of the figure required; and having the corner, and knowing it to be one-quarter of an inch upon each side, it is of course easily completed.

Fig. 32.

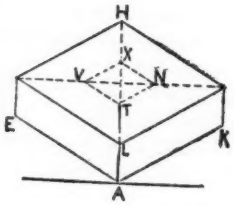


Fig. 33.

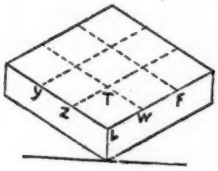


Fig. 34.

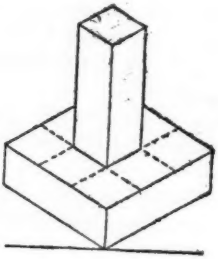


Fig. 35.

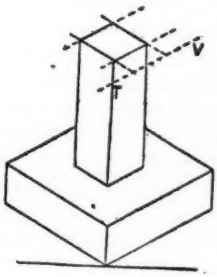


Fig. 36

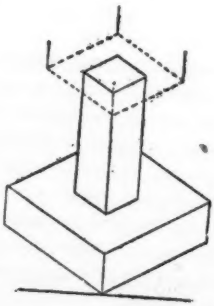
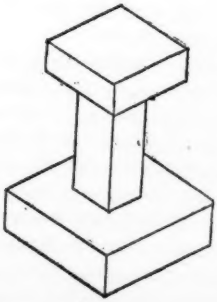


Fig. 37.



But if you prefer, after getting Z and W, you may measure off Z Y and W F just equal to the width of the standard, then drawing the parallels from the four points, you will have the figure formed by their intersections as in Fig. 33. You will readily see that if the standard were to be one-eighth of an inch from one edge of the base, and one-half of an inch from the other, its position would be found just as easily. To draw the standard, it is only necessary to draw vertical lines from the corners of the figure just found, each three-quarters of an inch, and join their extremities; this completes the base and standard as in Fig. 34. Those lines which represent edges behind the standard have been erased, and you will see that in this drawing it was not necessary to find all the corners of the little square. V, T and N, (Fig. 32), are the only ones it is necessary to measure from to make the standard. The square at the top can be completed just as well without measuring from X.

To put on the cap, you must extend the lines of the top of the standard as in Fig. 35, and measure on each of these lines the amount of the projection of the cap; in this case it is one-eighth of an inch. Now draw through these points the four lines that will represent the lower edges of the cap. One of these lines is T V in Fig. 35. The four lines are represented in Fig. 36. At the four corners or intersections draw little verticals to represent the corner edges, each one-eighth of an inch: these are also shown in Fig. 36. Now connect the tops of these little vertical lines. Make those lines heavy that you wish to retain, and erase the others, and your drawing will be like Fig. 37.

You had better repeat this exercise before drawing the next lesson, and draw all those lines very light that are not to be retained in the finished drawing.

JOHN BOYD.

CHAPTER X.

THE monthly meeting of the Institute Society was at hand. A committee chosen from among the older pupils had the monthly management in charge, and were now meeting frequently to confer together. They met in the assembly room at an early hour next morning. Their chairman, with his cap tipped back, was occupying the Professor's chair, and the rest were lounging on the Professor's desk, against it, or over the backs of chairs, when the Professor entered. He eyed them with a look of threatening suspicion. They arose to walk away. "Ah!" said the Professor, now smiling pleasantly, "the committee, I suppose?" They stopped. "Yes, sir," said the chairman. "Ah, I'm glad you are here.—

H'm 'm !—I have wished to speak with you about the meeting. I—; h'm 'm ! Have you appointed your orator yet ?" "Yes, sir ; we are going to have Miss Woodstock." The Professor did not reply at once. The smile on his face stiffened. It did not go away. His color grew very ashen. "Miss Woodstock !" he at last ejaculated. "Yes, sir," said the chairman." His name was Alva Laurel. "Come here, will you," said the Professor, "let us talk about that." They came nearer, and he leaned with one hand on his desk. "It is not customary, you know," said he. "What isn't ?" asked Alva. "To invite a female to speak," said the Professor. "We think she is a first rate speaker." "H'm 'm !—Yes.—A woman has words enough." "Miss Woodstock has sense." "It is the judgment of the oldest and most experienced minds," said the Professor, "that it is not proper for women to speak in public, since they are wordy rather than sensible." "Miss Woodstock isn't." The boys were turning away. "I shall find it necessary to interfere," said the Professor. "I am master here. The Society and all the affairs of the Institute are under my direction." The boys walked slowly away muttering to one another. Professor Beelen seated himself at his desk and commenced to write. He pushed his pen urgently. You could hardly have told whether his look was absorbed or vigilant. He now and then glanced toward the door. Presently some one was there outside. His ear was a quick one. He looked down upon his paper and wrote on busily. Miss Woodstock entered. He did not turn his face, but he saw her from the corner of his eye. He was too much absorbed with his writing to look up and bid her good morning. Perhaps she would at last go down to her room. She had closed the door, and was standing close by it looking at him. Still, without moving his head, he kept his eyeballs pushed far round toward her. And all the while he kept plying his pen, writing words without framing sentences. His expression was absorbed, intent, energetic. Miss Woodstock moved at last, and toward him. He kept on writing. Presently he seemed to become aware of the presence of some one, and first lifted his eyes abstractedly, and then looked up fully at her ; the abstraction passed away, and he smiled and greeted her. "O, good morning, Miss Woodstock !" he said, and extended his hand. She did not take it. His eyes slipped from side to side, but did not meet hers. "She has been to me," she said at last. "What ?" "She, the boy's mother." "The boy's mother ?—O, ah, you mean the mother of the boy—the one who came to obtain for him an entrance to the school. Ah, yes, I had forgotten. They come here from all directions and distances. One was here the other day from a town fifty miles—." "Henry Crane's mother. You whipped Henry Crane yesterday." "Crane ?—Ah ! let me see. I'll look into my book.—I do not find his name here. Ah ! now I recollect. I talked with him, and he was so penitent and so fair in his promises that I concluded not to whip him.—A snowy morning. I think

we may look for good sleighing at last." "Henry Crane is believed to be dying." Beelen turned white. Miss Woodstock glared pitilessly, until his face was like the wall. "I was not aware he was sick," said he. "His back was shown to me," she said. "There is extravasation, the doctor says—." "I am very sorry the boy is ill, and will call around to see him." "You'd better go get a rope and hang yourself!" She stepped towards him quickly. He drew back, his mouth opened exposing his teeth, and his hand went up with the fingers spread and hooked. She turned and walked to her own room.

The Professor settled down to his writing again. Some one else was coming now. *An officer?* The door opened and John Boyd entered. Beelen at once arose and greeted him warmly. "I'm glad you've come," said the Professor. "I've been wishing to resume that interesting conversation which was interrupted the other morning. You were, you remember, speaking of Shakespeare. Your remarks really seemed to me to be so valuable that I have wished to take them down." He took out his note book and pencil. Boyd stood leaning against the desk. "About Shakespeare?" "Yes," said the Professor, with clutching eagerness; "you used the word double, you recollect." "Double? The doubling of Shakespeare's chief tragic characters; yes, I believe I said something about that." "Yes, yes; that was it. Lear, you were saying, has his—his—." "Gloster." "Yes, yes," (writing). "Both, I believe I said," said John, "either really or supposedly encounter filial ingratitude." "Yes.—Lear has his Gloster; Hamlet his Horatio—." "Horatio? Did I say that?" "H'm'm, his—." "Laertes, isn't it?" "Laertes,—yes, that's what I meant to say; Laertes—." "Why," said John; "it is in accordance with a natural principle, I suppose, for almost everything in nature has its imitation. In the tragedy the chief character is the natural man, a man moved from the depths of his real nature; while the imitation is rather the conventional man—." "Yes, yes," interrupted the Professor, who had all the while seemed to be impatiently waiting.—"Macbeth has his Duncan." "Banquo," said John. "Banquo," assented Beelen, "that's the character. Banquo," (writing.) "Othello, his Iago. I think Iago is the best of all. What were you saying? You were speaking of—. Excuse me for interrupting you." "I was about to say," said John, "that astronomers tell us of double stars; Binary systems you know they call them. Well, as the secondary star appears to revolve about its primary, so the secondary Shakesperean character revolves about the chief tragic character. The works of Shakespeare are nature, as the works of God are nature. They must be in fact God's works wrought in and through the man Shakespeare. The same principle that has been discovered in what we call God's works is discoverable also in what we call Shakespeare's. And this is genius—." "One moment," interrupted the Professor, writing

hard in his note-book. "Excuse me. I trust we shall have these talks often.—H'm'm! I have a little writing to do before school." They bowed, and John walked away. "I have that Shakespeareana down," chuckled the Professor when alone. Then he wrote—'*Mem.* Boyd. Strange theology again. *Heterodox.*' Boyd stepped into a recitation room overlooking the playground. The boys were in an ecstacy of sport out in the snow. And no wonder. Pragge was among them.

CHAPTER XI.

Beelen stood alone in the assembly room. Having done with his memorandum book he glanced around. The wind suddenly slammed to the door of a recitation room behind him. He darted a look in that direction, but gradually turned his face away again, and looked all around him. Every door was closed, save that of the cap-room. With a stealthy tread he approached and softly opened the door wider and looked in. A large closet as well as a small one was there, but it was locked and he had the key in his pocket. He stole to the window that overlooked the approaches to the door, and cautiously surveyed the street. A knock at the door startled him. He stept softly to his seat at the desk, and began to write. The knocking was redoubled. He wrote on abstractedly. A boy came from Miss Woodstock's room and let in the visitor. Beelen did not look up. He was too much absorbed with his writing. But his eye-balls were turned toward the visitor. The latter was a middle-aged man, with a calm, determined look. He seated himself on the platform near the Professor. And still the absorbed Professor did not seem to be aware of the presence of his visitor. "I have come to see you," said the visitor, "about a certain boy." No reply. The visitor in a louder tone repeated the remark. Beelen raised his eyes a little, but the cloud of abstraction still dimmed their vision. "O, ah, yes; in one moment," said he; and he wrote on. The gentleman waited patiently. At length the Professor laid down his pen, folded the letter, and looked around toward his visitor and greeted him cordially. He held out his hand, but the visitor did not take it. "I am glad to see you," said Beelen. "Come and look at some of these pictures on the wall. They were drawn and painted by the pupils. We like to have visitors come to see us, and we always like to show these pictures to them." They walked together around the room, the Professor all the while talking, the visitor coolly dividing his attention between him and an inspection of the pictures. They came to one representing a grey cat that had crawled up on its mistress' dress at the dinner table, and was, with a sort of smile, rubbing its cheek against her, while its eyes were looking through their half closed

lids at the meat on her plate. The visitor stopped and looked alternately at the cat and at the Professor, as though struck with some sort of resemblance. When they had completed the circuit of the pictures, the Professor bowed to the stranger, as though he was now of course expecting him to go; but the stranger stayed. "I have some business with you," he said. "Ah!" The stranger glanced around. "Suppose we go to some room where we may be more private." "Well, I don't know," said the Professor. "This, you see, is empty, excepting the presence of ourselves." "How is this room?" said the stranger, throwing open the door of the cap-room. They entered. The visitor closed the door and stood with his back to it.

"I am called a determined man," said he, looking straight at Beelen. "My first impulse was to thrash you. But I deliberated and concluded that the law was better than lynching. The boy is a widow's only son. I am his uncle. Maggwell is my name. There is no other man to undertake the boy's protection. If he dies, I'll see that you are hung. If he lives, I will see that this costs you dear. I thought I would come and look at the creature that could do such a deed." "Your talk is enigmatical," said Beelen. "You must mistake me for some one else." "You are known in this community as Professor Beelen?" "Yes, sir." "The boy states that it was Professor Beelen who flogged him." "What boy?" "Henry Crane." "Henry Crane?" "Henry Crane." "When did he say I punished him?" "Yesterday." "No, sir. I did not punish him yesterday." "There are the marks on his person." "Not from my hand." "The boy states that they are from your hand." "It is preposterous!—Leave marks on a pupil!—The charge is simply preposterous." "Henry Crane's body is brutally marked. He says you did it." "I should like to see him prove it." "Ah, there are no witnesses, and the lawyers may be feed, and the law may be twisted, and justice may be thwarted, and the devil may after all chuckle;—and so, no witnesses being present now, and all these things being so, I will go back to the promptings of my original impulse, and will thrash you." He raised the slender cane which he carried, and dealt Beelen a sudden blow across the neck. Beelen cringed and uttered a low hissing cry, striking up his hand with the fingers clawed. The blows rained down upon him, until the stranger ceased, as though from very weariness, and turned upon his heel and left the room. "Severe, but better than the law," muttered Beelen, softly closing the door. He took off his coat. "Well dusted," he said with a laugh. "My neck—there must be marks on it. Blood there!—nothing serious though. Ha, ha! I'll cover them with a high collar and stock.—*He* won't tell of it for fear I'd prosecute him!—Better than the law. The boy's affidavit—t'would take nice lawyering to resist that." He wrapped his handkerchief about his neck, and went out into the assembly room. No sooner had he

closed the door, than the door of the larger closet opened, and a head was thrust forth. How Pragge could have got from the play-ground unobserved into that locked closet, is perhaps his own business. Suffice it that he was there. He drew a long breath that he emitted with a whew! "The pay is worth the stifling," he said. The door latch rattled, and he dodged in and closed the closet door. The Professor looked into the room and stared suspiciously around. Presently he withdrew and closed the door. Pragge remained, and when the boys marched through, he fell into the procession, and thus got out unobserved by the Professor.

Boyd had gone to his own recitation room, and there Beelen sought him. "Wouldn't you like to visit home sometimes?" said the Professor kindly. "That's just where I'd like to go," said John. "Well," said the Professor, "I will arrange matters so you can go—say next Friday afternoon, then you might stay over Sunday." "I thank you heartily," said John. "It is pleasant," said the Professor, "to do one another these little favors. It is what makes life happy. It is living up to the Golden Rule." "Have you a cold, Mr. Beelen?" "H'm'm, a slight tendency to one, so I wrapped this handkerchief around my neck; prevention is better than cure, you know." And the Professor went out with the smile of good will still glistening on his face.

CHAPTER XII.

Friday evening came. The Professor stood a little upon ceremony even if he did have supreme control of Institute matters, including the Institute Society. So he looked for a formal and reverential invitation to the Monthly Meeting. He looked in vain. Then he reasoned, that being Master of Ceremonies, he was of course expected to be there. Why then should they send him a formal invitation? So he went uninvited. The meetings were held in the Assembly room. A Babel chattering hummed on his ear as his foot touched the lower step of the stairs. Evidently they were waiting for him. He crept softly up the stairs. "Hope Old Hyp won't come!" "That's a bad boy," the Professor inwardly ejaculated. "I've had a good deal of trouble with him. I wonder they admit him here to-night." He lingered and listened. "Say, do you know what question's going to be up for debate?" "No, what is it?" "Is Zechariah Beelen a human being?" A roar, or rather a clatter of laughter, went up. It was an abominable noise in the Professor's ears. "I'll give that boy Tisdon a trouncing to-morrow, and expel him," thought the Professor. "This disrespect for teachers has a bad influence. It must be nipped in the bud." The cluster of boys at the door increased like a swarm of bees with stings. "Just think how he treated Hen. Crane!" "Crane

was getting better, but a fever has set in, and he's dying now, they think." "Beast!" "Murderer!" "Say, don't you think they'll hang him if Crane dies?" "He deserves it already." "I used to look up at Beelen when he was praying in school, and wonder how he could do it so. I've got over that." "You were green then, ha, ha!" "But hasn't he a saintly look though, when strangers are about. And what a saintly name he has—Zechariah—ha, ha, ha!" "He isn't fit to be in decent society. You never see anybody going with him. He tried to hire some one once to go with him; and the man he hired wouldn't go the time out." Loud calls for order arose from within. "Say, isn't Miss Woodstock coming?" The answer to this question was shut off by the closing of the door between the boys and the Professor. "Those are the unruly boys of the school," muttered Beelen, out in the dark. "I must clear them out. They are bad boys." Presently he rose from his crouching posture and entered. A single hiss sounded. It was taken up, and a dozen fell on his ear. He knew whence they came. He turned and glared. There was a dead silence. "If there are any geese here," he said, "they have liberty to leave as soon as possible. We, of the Society, are human beings." A laugh, a few groans, and then an ominous silence. The Professor seated himself on the platform close by the chairman, and leaned over and spoke with him sociably and familiarly. The notes of the previous meeting were read. Then some one in a front seat got up and offered a motion, which on being seconded, he proceeded to advocate. It related to Miss Woodstock, and that lady entered just as her name was pronounced by the speaker. As she walked past him, she said to him in a whisper, "You've been using my name, eh?" and passed on. "Order!" thundered Beelen, seizing a rule and striking it hard upon the desk. The boy sat down. "I didn't mean you," said Beelen to him softly. "Go on." "I have no more to say," mumbled the boy. Now ensued a dead lock in the proceedings. After a minute of silence, Miss Woodstock arose, approached the Professor, and whispered in his ear. He started, and turned pale. She passed out at the door. He rose to his feet as though to follow her, but seeing Mr. Demas entering, he resumed a bland look, and went to that gentleman, manifesting great pleasure at his coming. Beelen then led him to a seat on the platform, and without more ado, rose and began to speak. A general fit of coughing suddenly seized the audience, with the exception of the officers and Mr. Demas, who listened with respectful attention. The noise waxed furious, but Beelen kept on talking. He was upon the new Shakespearean criticism, the "Binary System criticism," he called it, and with blushing modesty, claimed it as original. At last he was through, and, with a flush of oratorical triumph on his face, turned to Mr. Demas, his sole auditor. The chairman had been engaged all the while in futile efforts at maintaining order. A loud long breath of relief went up from

the boys. "I've been much pleased, Professor," said Mr. Demas. He had a quick nervous way, and an observant and wary eye. His expression was extremely non-committal. "Sometimes," said the Professor, solemnly, "with these ideas on the mind, one feels as Paul did when he said, 'Woe is unto me if I speak not.'" The door was suddenly flung open, and a woman entered. Her hand was uplifted, and her look agonized and distracted. Her eyes sought the Professor, and she strode to him. "His blood is on you!" she cried. "To beat out his life! Oh—" "My good woman," said the Professor, trying to lead her away. "You've beat out his life!—you've killed—you've killed my boy!" "Madam!—Don't talk so here!—Here——." Beelen put his hand into his pocket, as though to draw out his pocket-book. She turned away and went moaning down the stairs. The boys exchanged looks, and some of them rose from their seats. "She's an insane woman," said the Professor, addressing Mr. Demas in a tone sufficiently loud for all to hear. "She's an insane woman, who sometimes comes here under the impression that some teacher has whipped her boy too severely." "That's a lie!" buzzed on the air from the direction of the boys. "It's Hen. Crane's mother!" "Shall we go?" said Beelen, hurriedly, taking Mr. Demas' arm. "Such things frequently occur," he said, as they walked down stairs. "A teacher is at any moment liable to these irresponsible and unjust imputations." "Yes; I see. The teacher is much subjected to false accusation." "Yes, yes. It is one of the unpleasant conditions of a teacher's occupation that he has to *force* his pupils. The teacher has to require them to learn much that they dislike, and this makes them dislike the teacher, you know. Ha! H'm'm!—I never give a pupil more than four blows at a time, and those are never heavy. Ah, Miss Woodstock—there's my great trouble! She is insubordinate, and sets the example of insubordination to the pupils. I try to bear with her. But—but really she ought not to be in the school. I fear I shall be driven to enter another complaint against her to the Board. I—I try——." "What do you trounce with—a fish pole?" "With a ratan." (Tone earnest, gentle, undulating, conciliatory.) "Ah!" They parted at the door. The hour was not late. "I think I'll go round to prayer-meeting," said Beelen. He presently stopped at a church edifice and entered the vestry-room. The congregation were singing a hymn. The singing ceased. "Brother Beelen, will you pray with us?" said the leader. Beelen arose and undulated through one of his prayers." "What a sweet man!" were whispered words that fell balmily on his ear from the lips of a neighboring lady, Sister Pillott, an earnest-looking soul. "He must be a meek, a holy man! What a divine prayer!" With a shining face the Professor arose and made a closing exhortation; and when the meeting adjourned, Sister Pillott came to him seeking an introduction, and she laid her hand upon his arm with a gentle stroke, and looked up

into his face in modest admiration. And his eyes looked down shepherd-like upon her from under their half-closed smiling lids. A young gentleman had been standing by the Professor's side. "Ah, Mr. Pragge!" said Beelen. "Let me introduce you to some of our brethren. Mr. Diesdoes, Mr. Pragge. Mr. Pragge, Sister Pillott."

That evening saw the Institute Society almost fall into pieces. After gravely debating the question which had been hinted at by the boy at the doorway, it was by a unanimous vote decided in the negative. Then one rose and said, "I respectfully offer my resignation as a member of the Wye Institute Literary Society." "Why?" The Professor, Master of Ceremonies, had ordered that a member, on offering a resignation, should give a reason therefor. Hence the chairman's "Why?" "Old Hyp," was the laconic and accepted explanation. This member was followed by the others, each in turn, every one dropping off by precisely the same process, until the chairman himself was reached. He vacated the chair, turned and addressed it, and thus, likewise, dropped off. And Zechariah Beelen was now at last the only remaining member—the Society's sole pillar and token of existence.

ON THE SUBTERRANEAN SOURCES OF THE WATERS OF THE GREAT LAKES.

IF we take down the map of North America, and follow around the borders of our chain of Great Lakes, we find that the tributaries for supplying the mighty torrent of water which pours in immense volumes over the Falls at Niagara, and thence through the St. Lawrence to the sea, are few in number and insignificant in effect. Lake Superior, the largest body of fresh water in the world, has an area of 32,000 square miles, and a mean depth of one thousand feet. There are a few small streams, none worthy of the name of rivers, which find their outlet in this lake—the St. Louis and Ontonagon are the largest of these; but there is probably not water enough discharged into the lake to make up for the atmospheric absorption and evaporation. The entire State of Wisconsin, even from the very borders of Lake Superior, is drained by rivers, which flow into, and are tributaries of the Mississippi. These are, in chief, the Wisconsin River, the Black, Chippewa, Fox and Rock Rivers, the waters of which all flow southward to the Gulf of Mexico. The whole State of Minnesota, with its thousands of lakes and streams, may be called the mother of the Father of Waters—for all of her waters which do not gather into the great Red River of the North are discharged into the Mississippi, and do not contribute to keep up the supply of Lake

Superior; and on the northern shore of the lake, in the British possessions, there are no rivers which flow in this direction. Here the current is the other way, and the streams find their way to Hudson's Bay, and other more northerly seas. The outlet of Lake Superior is the river St. Mary's—a stream of considerable magnitude—which discharges the surplus waters of the Lake in the direction of Lake Huron. Lake Superior is 627 feet above the sea level.

If we examine the surroundings of Lake Michigan, we shall find the evidences of this theory still more striking. This lake has an area of 22,400 square miles, and a mean depth of 900 feet. It is above the sea level 578 feet or forty-nine feet below Lake Superior. It is also an immense body of water, whose sole apparent sources of supply are found in a few small streams which flow into it from the State of Michigan.

The largest of these are the Grand and Manistee rivers; from Wisconsin there is only one small stream, the Milwaukee river, at Milwaukee. From Illinois there is only the Chicago river, a sluggish stream without a current; and indeed there is, at only ten miles distance from the banks of the lake south and west, the water-shed called the Summit, which separates the waters which flow into the St. Lawrence from those which flow into the Gulf of Mexico, and from the southern slope of this Summit, flowing southward, is the Aux Plaines river, a tributary of the Illinois. So that Lake Michigan gets no water from Illinois, but a trifle from Wisconsin, and very little from Michigan. And yet the straits of Macinaw carry off a large quantity of water from this lake, and Lake Michigan furnishes its due proportion of the great current which passes over the Falls of Niagara. Now the question arises, whence comes this great volume and mass of running water?

Geologists are tolerably familiar with the subject of underground streams and water courses. They know that the crust of the earth is full of these streams, and although from the fact that they are generally concealed from sight, there must be considerable speculation concerning them, yet there are cases, such as in the Mammoth Cave, Kentucky, the Adelsberg mountains in Switzerland, and numerous artesian wells scattered all over the world, the lost rivers on our western prairies, etc., from which a positive knowledge may be derived concerning the nature and history of these rock-bound rivers.

The artesian wells in London furnish now about 12,000,000 of gallons of water daily. This is the seepage of the valley in which the great city is located. The water from the whole country surrounding finds its way along the tilts and inclinations of the broken strata, below the chalk beds, in among the sands and gravel, whence it is taken by boring into the ground to the depth of about 600 feet. It does not appear probable that there are any considerable streams in this vicinity, for the entire of

the underlying gravel beds seem, as it were, saturated with water, which is reached at any point of perforation.

These remarks apply to the wells of Grenelle and of Passy, in the basin of Paris, with the exception in the case of the latter that they struck an amazing stream of water eighteen hundred feet below the surface, which discharges nearly six millions of gallons per day, rushing to the surface with great power and velocity. This is strong evidence, certainly, of a great underground stream at this point. The great wells of Kissingen in Bavaria, at Munden in Hanover, at Louisville in Kentucky, Charleston, S. C., and hundreds of others, many of which are two thousand feet deep, discharging great volumes of water—all tend to demonstrate the fact that the crust of the earth is penetrated in all directions, and at all depths, with these streams and water courses.

Adopting this as a conceded fact, let us once more turn to the map of North America, and note particularly the point where the thirty-second degree of west longitude crosses the forty-fourth parallel of north latitude. Within a radius of five hundred miles, of which this is the center, will be found the great water-producing region of the West. In this elevated and comparatively uneven surface of the country, nearly all of the great rivers of the West have their sources and fountain-heads. First, the Missouri, with its innumerable branches and tributaries, among which are the Yellowstone and the North Fork of the Platte, the Arkansas, the Red River, the Rio Grande, all flowing from the eastern and southern slopes of the Rocky Mountains, and finding their way through thousands of miles of country to the Gulf of Mexico. On the western slope is the Rio Colorado, which empties into the Gulf of California, and which is formed by the union of the Grand and Green rivers, the sources of which are also within the territory above mentioned. The same statement is true of the Columbia river, flowing through the State of Oregon into the Pacific, and of the other great streams and rivers which flow northward and westward into the Pacific and the Northern oceans. Thus the knowledge we already possess of the surface streams of this great extent of territory, all tends to demonstrate the truth of the theory in relation to the water producing region, its location, extent and capacity, and also that on the surface there is but comparatively a small amount of this water which finds its way into our Great Lakes.

It is a well-known fact to travelers on our western plains, that large streams, often rivers in size, suddenly disappear, falling away into great fissures and chasms, sometimes reappearing, but more frequently lost forever; where and in what manner does this water find an outlet? What becomes of the mass of water which falls upon the earth and is absorbed by the soil and the rocks below the beds of rivers and streams? The crust of the earth abounds in water to unknown depths, and from the

nature of the element, it must create for itself ways and courses of travel, as plainly beneath as upon the surface. And now, if the Great Lakes are not supplied by means which are upon the surface and apparent to the eye, it follows as a natural consequence that their sources of supply must be underneath the ground. The outlet of these lakes discharges an enormous quantity of water, the visible inlets are mere trifles in comparison—and thus there seems to be no other conclusion on the subject but that the water supply comes from below the surface of the ground. This water probably finds inlets at different points on the bottoms of the lakes, and maintain the supply with as much certainty and regularity as if the streams were running on the surface of the ground. This theory is further, and I think more particularly demonstrated by the great mass and volume of water which is now being discharged by the Chicago artesian wells. These are over seven hundred feet deep—nearly penetrating the earth to a line parallel with the bottom of Lake Michigan—are located in no great valley or depression, such as the basins of Paris or London. The water has a head of nearly one hundred and twenty-five feet above the level of the lake ; is much colder than the mean temperature of the location of the wells, being now 57 degrees Fahrenheit ; these facts tending to show that it must come from a more elevated region of country, and also from a higher latitude. There are two other facts corroborative of this point. When the water was first struck the temperature was 59 degrees Fahrenheit ; it has fallen now two degrees, or to 57. Then, the first analysis of the water exhibited 72 grains to the wine gallon of mineral matter held in solution ; the second analysis, made only one year afterwards, showed only 56 grains of the same matter. These facts, taken in connection with the great head of the water, seem to establish exclusively that it comes from some remote region of the north or northwest.

It is also probable that the great under-ground stream, penetrated by these wells, once discharged its waters into the bottom of Lake Michigan ; but this outlet was closed by the upheaval of the earth's crust, which is visible at the point of the location of these wells, and at the present time there is no outlet except the artificial one made by the drill. This supposition is proved by the head and the great force and power of the water ; for if it had a lower outlet, anything like the size of the stream, it would not show a head much, if any, above the surface of the ground ; and it is also sustained by the facts mentioned above—the decrease of the temperature of the water from fifty-nine degrees to fifty-seven degrees, and the diminution in quantity of mineral matter held in solution—the latter fact seeming clearly to prove that prior to the time when the drills penetrated the stream, the water had dissolved and absorbed a large quantity of the soluble matter of the rocks with which it came in contact in its state of

rest. As soon as an opening or outlet was made, and a quantity of water was discharged, this mineral matter decreased in proportion, and the probability now is that the water will become softer and purer as the amount discharged becomes greater, and that eventually, and probably at no distant day, the water will come from its fountain-head simply filtered and purified by its passage through the sandstone and gravel beds.

That the outlet of this stream into Lake Michigan was closed by the upheaval of the earth's crust, is a probable conclusion, which can be verified by an inspection of the grounds on which these wells are located. The surface here is only some seven or eight feet above the level of the surrounding prairie; but geologically or stratigraphically, it is nearly one hundred and fifty feet above the common level of Chicago, that is, at about one mile distant eastward and into the city. We bore into the soil nearly one hundred and fifty-feet before reaching the same rock, which is here exposed upon the surface; and at the well bored at the Chicago Distillery Company's premises on the North Branch, they penetrated the Joliet marble at a depth, I believe, of one hundred and eighty-six feet, which at the other point is only twenty-nine feet from the surface; this and various other facts show the nature and extent of this convulsion, and that it was no difficult feat of nature to dam up this comparatively trifling underground stream, and leave its waters pent up in the rocks and caverns for the future use and benefit of man.—*Geo. A. Shufeldt, in The American Journal of Science and Arts.*

EDUCATIONAL APHORISMS.

THERE is no Education more neglected, and none more needed than that which teaches the pupil from the outset that this world is a workshop for every man and woman: that sooner or later the work must be done, and that he or she will be happiest who best comprehends the work, and is best qualified to do it.

UNDER whose care soever a child is put to be taught during the tender and flexible years of his life, this is certain—it should be one who thinks Latin and languages the least part of education—one who, knowing how much virtue and a well-tempered soul are to be preferred to any sort of learning or language, makes it his chief business to form the mind of his scholars, and give that a right disposition, which if once got, though all the rest be neglected, would in due time produce all the rest; and which if it be not got and settled so as to keep out ill and vicious habits, languages and sciences and all other accomplishments of education, will be to no purpose but to make the worse or more dangerous man.—*Locke.*

THE MONTHLY.—MAY.

JUVENILE CRIMES.

THE increased and increasing number of committals for crimes perpetrated by those under the age of maturity, is a subject that may well excite alarm. It is estimated that the annual returns of such incarcerations have trebled in the cities of New York and Boston since the year 1840. There are those who place the estimate at a much higher figure. Nor is this increase in numbers the sole subject of apprehension. The character of the crimes is deepening. The collusion and ready ganging together of young desperadoes for burglary, forgery and crimes of like degree, has excited the close attention of the police authorities. With them the innocence of youth is a myth, a thing of the past. Mere children have lately been captured and caged by the hundred for gambling.

We claim to have instituted in the centres above mentioned, the most effective system of popular education the world has ever beheld. Considering the time it has been in operation, it ought to bear to be tested by the effect produced upon the general character of the juvenile community. The sorrowful returns cited make us shrink from applying such a test. True, the morals of the community are subject to many powerful adverse influences for whose effects the schools are not strictly responsible. But the schools may justly be expected to counteract such influences more than they do. The large portion of time children pass in school, forbids the idea that the public has no right to look to them for a moral as well as an intellectual effect upon the community. To negative this just expectation is to admit that in its most important aspect, our educational system is a failure.

It may be claimed with some degree of plausibility that the juvenile criminals whose names swell the police reports, are not children who attend or ever have attended the public schools. This, if true, only proves that our school system fails to reach those who most need its influence, but does not relieve us of the responsibility of devising a system that shall reach them.

Ignorance and sin, we are told, are natural adjuncts and allies. Generally this is true. An ignorant person, though not necessarily vicious, is more likely to be surrounded by circumstances calculated to make him

vicious, while at the same time he has less power to resist their influence, than one who is *properly* educated. But the opposite may as truly be said of one who is *im*properly educated; and it is not impossible that an increase of general intelligence may be accompanied by a decline in public morality. Our criminal records assert such a decline in juvenile morality in our cities to be the fact. The assertion cannot be evaded; it must be met, and if, by sins of omission or of commission, the schools are in any way responsible for the fact, their reformation is imperative. Whether our public schools have promoted the intellectual development of our youth, is not now the question; but rather whether such intellectual development is the full measure of what we may hope to obtain under the name education as it is. Our school system disappoints us. We look to it for results which do not follow. Our disappointment we believe to be owing to faults, both in the system of instruction and in its execution—faults which prevent the exercise of a proper school influence in some cases, and nullify it in others. These it is our purpose, at the risk of being considered captious and fault-finding, to criticise from time to time, freely and fearlessly, hoping thereby to awaken discussion that may result in needed reform. A notice of certain defects in the organization of our public schools, and of the popular notions and practices which tend, in our opinion, to diminish their efficiency in the proper moral training of children, has been crowded out of this number. It will probably be given in our next issue.

Foreign Estimate of American Schools.

SOME time ago our attention was called by our excellent neighbor, *The Nation*, to an article on "The Instruction of the People in the Nineteenth Century," written by M. Emile de Laveleye, and published in the *Revue des Deux Mondes*. Finding the article worthy of the high commendation given it in *The Nation*, we have had it translated for The Monthly. The part given this month shows the appreciation in which our public schools are held by intelligent foreigners. M. de Laveleye's estimate of their influence is certainly gratifying to our national pride; yet we cannot but fear that it is founded rather upon what is claimed for our schools,—what they ought to accomplish, than upon what they really do accomplish.

CORRESPONDENCE.

THE PRONOUN *WHO* AGAIN—THE STUDY OF GRAMMAR IN OUR SCHOOLS—REPLY TO J. E. N.

MR. EDITOR—Your correspondent, J. E. N., (in your March No.) is interested in the right answer to the question, what part of speech is *who* to be called in the sentence, "I know who troubles you." He contends that it is a relative pronoun, and endeavors to show that your correspondent from Flushing, (November No.) is wrong in calling it an interrogative. Wisely omitting to cite any authorities with which to meet his antagonist, he simply bases his argument on the fact that the sentence is an affirmation, is declaratory,—that there is nothing interrogative in it, and observes that if the "whole form" of the sentence were "question-asking," as e. g. in the sentence, "Do you know who troubles you?" there would be some good reason for the use of the name interrogative.

Such is J. E. N's. reasoning. The question which he attempts to answer involves one of those principles which, being exemplified in all languages, belong to Universal Grammar, i. e. the science which treats only of the laws pertaining to language *as such*. It will, therefore, be perfectly legitimate to decide the matter in dispute by a reference to Latin Grammar, the more so as Latin offers us the further advantage of two distinct forms for the interrogative and relative *who*. J. E. N.'s argument proves, in my opinion, conclusively that he has but a feeble conception of what grammarians call "quæstio indirecta," i. e., a question contained in a subordinate clause. He seems to think that interrogative pronouns can only be used in direct questions, and that the nature of the pronoun (or particle) which introduces a dependent clause is determined by the *form* of the principal clause.

Let us go back to first principles. Pronouns (or particles) used in questions are called interrogative. J. E. N. concedes that in the simple sentence, "Who troubles you?" *who* is a substantive interrogative pronoun. (Let me add here, incidentally, that I do not adopt the arbitrary distinction of Greene, Anal. p. 122, who calls direct questions only such as "require an affirmation or denial," and indirect questions those which "refer to a part of a corresponding declarative sentence.") Now it may happen that a simple sentence containing a question becomes the grammatical subject or object of the verb in another sentence. The question which was originally direct, becomes then an indirect or dependent question. In our case the proposition containing the direct question, "Who troubles you?" has been made the object of the verb *know* in the sentence "I know," and has thus been turned into a subordinate clause. It is obvious that the word *who*, in the (now complex) sentence, is the identical self-same *who* which was used, or would have been used, in the simple sentence "Who troubles you?" and consequently is an interrogative. It remains for J. E. N to show why this change from a leading to a dependent clause should alter the nature of its grammatical subject *who* any more

than that of its object *you* which was before and is now a personal pronoun, just as *who* was before and is still an interrogative pronoun.

It is true that Fowler (Engl. Gr. p. 239), and Hart (p. 58), call the pronouns *who*, *what*, and *which*, occurring in indirect or "nominal" questions *Responsives*, because, as F. says, the word used to answer the question must be the same as the one used to ask it. But this coining of new terms is uncalled for, nor does the reason adduced cover the whole ground, for the leading clause may be itself a question, in which case the complex sentence contains no answer at all. Equally objectionable is the term *Connectives* used by Greene. If a distinction is to be made—after the analogy of the Greek, which has two distinct forms, one for direct, the other for indirect questions,—we may speak of interrogatives used directly, and interrogatives used indirectly. (Morrell Anal. p. 37.) There is, however, no need of "multiplying technical terms," a practice which J. E. N. justly condemns. All that is needed is a clear conception of the nature of an "indirect question," i. e. a question used as the subject or object of verbs, (Morris p. 164), or in other words, a question the substance of which is stated in a dependent clause *without the interrogative form*.

It is evident that the character of the pronoun introducing the subordinate part of the complex sentence does not in the least depend upon the *form* of the leading clause, and therefore cannot be determined after the manner of your correspondent J. E. N. The truth is, the principal clause may be affirmative ("declaratory,") interrogative ("question-asking,") imperative, exclamatory, optative, or what not,—yet the nature of the pronoun in the dependent clause will remain the same. In each of the sentences "I know who troubles you," "Do you know who troubles you?" "Tell me who troubles you," etc., etc., *who* is precisely the same.

The whole trouble in this matter arises, as J. E. N. suggests, from the fact that our *who*, exhibiting, like Janus of old, a double face, is interrogative as well as relative. Fortunately, there are other languages free from this defect, and to avoid being "misled," we can turn to Latin, which furnishes, at least for the given case, two separate forms. I venture to assert that there is not a Freshman in Yale or Harvard who would, in translating our sentence into Latin, hesitate to render *who* by *quis*, (interrog.), instead of using *qui* (relat.) Submit the sentence to any German mechanic, who has sufficient knowledge of English to understand the meaning of the five words of which the sentence consists, and he will, without a moment's reflection, translate *who* by *wer* (interrog.,) and not by *welcher* (relat.)

Schmitz (Class Ser. L. G. p. 261), says: "All the interrogative pro-
" nouns and adverbs which are used in direct questions occur also in
" indirect questions. *The beginner must be on his guard not to confound*
" *relative clauses with indirect questions.* The relative always has an
" antecedent, either expressed or understood, but the interrogative pro-
" noun has not, as in 'I say what I think,' i. e. that which I think, *what*
" is (or contains) a relative pronoun: but in 'Tell me what you think,'
" *what* has no antecedent, the meaning being What do you think?—Tell
" me." Applying this rule to our case, we see that *who* cannot be a relative pronoun, for there is no antecedent to which it relates, and the impossibility of substituting for it the pronoun *that*—which also is a relative pronoun, and may be applied to persons like *who*—is at once apparent.

But, says J. E. N., "I find in Webster that *who*, as a compound relative, means *the person that*,—and according to this "I know not who troubles you," has its equivalent in "I know not the person that troubles you." I deny the correctness of the inference. No one, indeed, will dispute that *who, what* and *which* are often *compound relatives*, so called, because they include, as it were, the antecedent demonstrative and the relative. In such sentences as "Who steals my purse, steals trash," "What I say is true," "Is what I say true?" etc., *who* (=he who) and *what* (=that which) are compound relatives, though J. E. N., to be consistent with himself, would probably take *what* in the last sentence to be an interrogative, because the whole form is "question-asking" (!) But it is not true—and this is the hinge on which J. E. N.'s argument turns—that the two sentences:

(A) "I know who troubles you," and

(B) "I know the person that troubles you,"

are equivalent. Although they seemingly convey the same idea, they are essentially different, grammatically and logically.

In (A) the grammatical object of *know* is the whole clause, "Who troubles you?" in (B) it is the noun *person;* in (A) the subordinate clause is a substantive clause, in (B) an adjective clause, modifying the antecedent *person*. The sentences are logically unlike, for in (A) the knowledge which I possess relates to a *thing*, a *fact*, while in (B) it refers to a *person;* in (A) my knowledge simply enables me to answer the question "Who troubles you?" while in (B) I assert that I am, personally or otherwise, *acquainted with* that particular person who happens to be your tormentor.

This is far from being what it would seem to be at the first blush—a distinction without a difference. To say that we may know who a man is, without knowing the man, is a mere paradox—a statement *seemingly* contradictory, yet true in fact. If the writer of these lines were asked: "Do you know who is now Mayor of the City of New York?" he would promptly answer "Yes;" but to the question "Do you know the individual who is now Mayor of the City of New York?" his reply would be "No," for he knows nothing about Mr. Hoffman, except his name and political complexion, and is, therefore, unable to say that he *knows* Mr. H., while, on the other hand, the scanty knowledge which he does possess, would justify an affirmative reply to the former question.

J. E. N. suspects that your correspondent from Flushing has been misled by the amphibious character of the pronoun *who;* but the truth is that J. E. N. himself has been misled by the fact that the verb *know* may be used in speaking both of persons and things. If we make a slight change in the wording of (A), and say e. g. "I cannot say who troubles you," or "Who troubles you, is no mystery to me," J. E. N.'s theory falls to the ground, for it would be impossible to substitute "I cannot say the person who, etc.," or "The person who, etc., is no mystery to me." Let us have once more recourse to Latin, and the difference between (A) and (B) will become still more marked. In (A) *who* will have to be rendered by *quis*, in (B) by (*eum*) *qui;* in (A) the verb of the dependent clause will be *vexet* (subj. mode), while in (B) *vexat* (indic.) will be admissible; in (A) the proper translation for *know* will be *scio* (referring to things), in (B) *novi* (ref. to persons). So in turning the two sentences into French, in (A) the verb *savoir* will have to be used; in (B) *connaître*, —so in German, in (A) *wissen*, in (B) *kennen*, etc. etc.

It is hoped that J. E. N. is now prepared to admit that (A) and (B) *do* convey different ideas. But, to follow the drift of his argument, he may perhaps say, it is possible that the speaker, while intending to express the thought contained in (B), from lack of accuracy or from inability to perceive the logical distinction, has chosen the form (A), and that in this case, at least, his (J. E. N.'s) theory must be correct, and *who* be a relative pronoun. To such reasoning we would reply that Grammatical Analysis never supposes the speaker to mean what he does not say. It would be, to say the least, a very unsafe practice to judge of the grammatical function of a single word merely by the meaning of the proposition in which it is found. We can express the same thought in many different ways, and we can change the grammatical structure of a sentence without in the least altering its meaning. With the same propriety it might be argued that a noun, which happens now to be the object of a verb, will retain its character after we have changed the sentence from the active to the passive form, thus converting the former object into the subject.

It is more than probable that in J. E. N.'s mind the boundary lines between the respective provinces of relative and interrogative pronouns are not sharply drawn. When he says that "I know who troubles you," is equivalent to "I know who it is that troubles you," (which is logically correct), and further on, "I know what thou sayest," equivalent to "I know what it is that thou sayest," (equally true!) *intending thereby to prove his case*, he appears not to have the slightest suspicion that the *who* and *what* in the paraphrase are again interrogative pronouns, though, indeed, they are now modified by relative clauses. Perfectly primitive is his attempt to convert the interrogative *which* in sentence No. 3, "I told him which of the books to get," into a relative by the arbitrary insertion of such antecedents as "*number*" or "*name*."

J. E. N. gravely enjoins upon teachers a careful use of "names and technical terms and phrases," significantly adding that "English Grammar is a dry study to almost all pupils." The truth of this remark, which with equal force may be urged against the study of every pure science, depends entirely on the qualifications which the teacher brings to his task, and the method he adopts in imparting instruction. The "grave objections" which, as J. E. N. further informs us, "are urged against the study of Grammar in our schools," can proceed only from those who mistake the object of such study. Grammar is not designed primarily as a means of learning languages, but its chief end and aim, as indeed that of all education, is mental discipline. The proper study of language is the preparatory discipline for all abstract thinking, and if the intellect is to be strengthened in this direction, we must begin the process here. A mere knowledge of the rules of Grammar can no more enable us to speak and write correctly than a mere knowledge of the rules of Logic can enable us to think well.

We do not need the authority of Latham to be convinced that "if persons merely mean to speak and write with *average* correctness, they can get what they want without any grammar at all." It is obvious that Grammar, embracing as it does the conditions not merely of "average," but of perfect correctness, is a useless study for the class of persons specified; but this does not prove the validity of Latham's argument in deciding the question whether, or not, grammar should be excluded entirely from our schools. What Bowen observes with regard to Logic (L. p. 33) applies

here also. "The process of thinking, as well as that of expressing our "thoughts in language, like every other operation in nature, does not take "place at random, but according to certain fixed laws, or invariable modes "of procedure. We follow these laws for the most part unconsciously, and "a distinct recognition of them is not necessary for correct thinking or "speaking." It is the grammarian's duty merely to set forth these laws which control the formation and the use of language. He only furnishes the key to the meaning of words and the structure of language. His purpose is not so much to teach us a new mode of speaking, as to teach us how we always have spoken. The science of grammar, to use the words of Sir W. Hamilton, advises merely the better performance of existing obligations, without attempting the imposition of new ones. It is true, therefore, that Grammar does not extend the boundaries of human knowledge and only investigates immutable laws; still, inasmuch as it develops the application of these laws, it bestows on us to a certain extent a dominion over our thoughts themselves. Neither "Murray" nor "Tooke" is intended to give the student facility in the art of writing and speaking, any more than a Treatise on the mathematical principles of Optics is designed, primarily, to improve our sight. It would be as reasonable for a writer on the laws of Harmony to adopt for his title, "Counterpoint, or the Art of performing well on the Piano," as it is to consider "Murray" a guide to conversation.

The remark of Dymond, that "a boy learns more in an hour's conversation with educated people, than in poring for days over Murray or Tooke," proves nothing, because it attempts to prove too much. This is falling into Scylla while trying to avoid Charybdis. It is plunging into the mire of utilitarianism to escape from the "dry" atmosphere of abstract sciences. Following this line of argument to its logical conclusion, we should have to banish from our schools all branches of learning that have no immediate bearing upon the practical wants of daily life. Surely, no intelligent teacher is disposed to undervalue the advantages that result from moving in good society, or to advocate the "poring for days over Murray." A true system of education aims at a judicious combination of theory with practice. Is not every recitation of the young learner an hour's conversation with an educated person. And do not these conversations afford the additional advantage of systematic regularity, and are they not carried on for the very purpose of doing away with the necessity of "poring" over text-books? Every teacher of ordinary capacity admits that the silly practice of learning by rote and committing to memory abstrusely worded rules, will have no other effect upon Jack than to make him a dull boy, and will, in all probability, leave him in the end more ignorant of grammar than he was when the "poring" process began. On the other hand, if we should ask a young man without knowledge of grammar, though he had always moved in "our best society," *why* it is wrong to say "Between you and I," "She looks prettily," "I done it," "There is many people," "From thence," etc.—(I select at random a few of the thousand and one grammatical blunders which are often heard, especially among the lower strata of society)—he would probably have no other than the pitiful reply: "*Somehow*, it does not sound right."—"*Felix qui potuit rerum cognoscere causas!*"

This unjust depreciation of the study of grammar, which, I regret to

say, is steadily losing ground in our schools, is due, in great part, to the extravagant pretensions formerly put forward in its favor, as well as to the obstinacy with which many teachers "of the old school" adhere to the beaten track of their predecessors. The article, "Grammar Gone Mad," which you copied from an English periodical in the February No. of your Monthly, contains a very truthful and graphic exposition of the folly so common in former years of burdening the boy's mind with a thousand (to him) unmeaning technicalities, and administers a well-deserved rebuke to those who would perpetuate abuses which have already existed too long. All enlightened teachers of the present day, though they may honestly differ as to minor questions, concur in the necessity of reform. The opinion is daily gaining more ground that the present method of pursuing grammar is open to many objections, and that it would be better to reserve its study for riper scholars, who are already familiar with the forms of sentences and the idioms of language from "extensive reading," but to atone for the "error of putting a good thing in the wrong place," by expunging grammar entirely from the catalogue, would be as absurd as it is to burn a barn for the sake of getting rid of the rats.

The saying of our old friend "Lauriger Horatius"—"*Dum vitant stulti vitia, in contraria currunt*"—is as true now as it was at his time.

F. H.

STOCKBRIDGE, MASS.

A CORRECTION.

MR. EDITOR—I regret to find, in your notice of Mr. Peabody's gift, to Mr. Winthrop and others, for the use of our youth, you inform your readers that "*this munificent gift has awakened little or no gratitude in the South.*" In this statement you do great injustice to Virginia I know, and I am confident to the people of the South generally. The General Assembly of Virginia, by the *unanimous* vote of both Houses, has recorded, as well for their constituents as for the members themselves, not only the grateful appreciation of the Legislature of the noble gift of Mr. Peabody, but their gratification, in the belief that this generous act is an evidence of a desire on his part to restore, if possible, amicable relations between the people of the States. When I return to my seat next week, I will, if I do not forget it, furnish you a copy of the joint resolutions. I heard, pending the consideration of the resolutions, no objection to a participation in the benefits of the fund by our colored people.

Very respectfully, F. N. W.

FARMVILLE, VA., *April 4th*, 1867.

[NOTE.—We are happy to learn from the foregoing letter, and from other sources also, that the reputed "leading exponents" of Southern opinion, on whose statements we based our estimate of Southern feeling with regard to the Peabody gift, did not correctly represent the sentiment of the more liberal and intelligent, and we trust the larger, portion of Southern people.—EDS.]

EDUCATIONAL INTELLIGENCE.

THE bill establishing a National Bureau of Education, recently passed, provides for the appointment of a Commissioner and three assistants, whose duty shall be to collect and diffuse information on the subject of Education, and to report annually to Congress such statements and recommendations as may be of value to the country, beginning with a history of the various land grants made by Congress for the promotion of Education. Hon. Henry Barnard has been appointed Commissioner, and has resigned his position as President of St. John's College, Annapolis, Md., to give his whole attention to the duties of his new office. Mr. Barnard has been identified with educational interest for many years, and has had every opportunity for acquiring experience and information. Aided by good working assistants, there is no doubt that the Bureau under his direction will prove the means of doing much good in "the collection and diffusion of information." This restriction of the duties of the Bureau is eminently wise, and we trust that in spite of the present tendency to consolidation in school affairs, the Commissioner will never aspire to the position of director or official adviser in matters of school government, methods of instruction, or the adoption of text books. With powers that too many people are disposed to grant, the Bureau would be likely to work more harm than good.

At a late meeting of the trustees of the Peabody Educational Fund, the chairman, Mr. R. C. Winthrop, announced that he had received from Mr. Peabody bonds covering the whole of his gift. The leading design of the Board in the use of the funds, will be the promotion of primary or common school education, by such means as now exist or may need to be created. To this end the training of teachers will be encouraged by the endowment of scholarships in existing Southern institutions, by the establishing of Normal Schools, and by aiding such normal schools as are now in operation in the Southern and Southwestern States. The promotion of education in the application of science to industrial pursuits, will also receive their attention. Rev. Dr. Barnas Sears, then President of Brown University, was nominated General Agent, to have, under the supervision of the Board, the entire charge of carrying out the designs of Mr. Peabody. He has accepted the appointment, and has severed his connection with the university, to enter upon the work. A donation of 100,000 elementary school books, offered to the trustees by Messrs. Appleton & Co., was promptly accepted. Messrs. Appleton & Co. are to be congratulated on their success in one of the shrewdest business dodges of the day. MAINE.—The trustees of the Agricultural College have selected a farm of 375 acres on the Penobscot, near Bangor, have procured live stock, begun some experiments, established a brickyard, and purchased building materials. They propose to erect four buildings for college purposes, and ten cottages for the faculty and students, wisely discarding the antiquated system of commons and four-story dormitories, which are particularly ill adapted to the requirements of agricultural schools. NEW YORK.—The Assembly has passed the act abolishing the

Rate Bill, and making all schools in the State, except those in cities and villages, free. The school tax is raised from $\frac{3}{4}$ to $1\frac{3}{4}$ of a mill. The bill met with no opposition, though it was defeated last year.—The Fifteenth Annual Report of the New York Juvenile Asylum shows the operations of that institution, for the past year, to have been extensive, and its influence salutary. The Asylum is designed as a home and reform-school for vicious boys and girls, as well as a refuge for uncared-for children. Children between the ages of seven and fourteen years are received at the House of Reception, where they are detained six or eight weeks before being sent to the Asylum. The number of children in the House of Reception on the 1st of January, 1866, was 92, the number committed and surrendered during the year, 853, and the number received from the Asylum, 52. The whole number in the House during the year was 997, and the average, 117. The number of children in the Asylum on the 1st of January, 1867, was 453, the number admitted from the House of Reception 643, and the number returned from the House 52. The whole number during the year was 1,148, the average 470, the greatest number at any one time 486, and the lowest number 444. The number remaining on the 31st of Dec., 1866, was 464.—The Society for the Reformation of Juvenile Delinquents has just issued its forty-second Annual Report. On Jan. 1, 1866, there were 939 children in the House of Refuge; 892 were received, and 860 were discharged during the year; 971 remained in the House on 1st Jan., 1867. The expenses for the year were $119,591.64, and the receipts $109,783, a deficiency of $9,808.64.—The Medical Department of the University of New York City has suffered little from the burning of its building. Its connection with the New York Hospital is likely to be permanent. PENNLYLVANIA.—The bill taking from the School Directors of Philadelphia the power to elect the School Controllers, and vesting it in the Courts, has become a law. ILLINOIS.—During 1866, $4,359,238 were expended against $3,193,636 in 1865. The highest monthly salary to male teachers was $240, to females $110; the lowest to males $13, to females $6. The number of school districts is 9,938, of which 502 had no schools in 1866. The number of male pupils is 320,977, of females, 293,682; number of teachers, 17,279; number of school houses, 9,753, of which 612 were erected during 1866. The biennial report of Superintendent Bateman is elaborate and outspoken. In ability it is second only to those of the Superintendent of Public Instruction in California. MINNESOTA.—The office of Superintendent of Public Instruction, created by the last Legislature, has just been filled, by the appointment of Hon. Mark H. Dunnell, of Winona. TENNESSEE.—Under the new school law, the State is divided into about 7,000 sub-districts corresponding to single school districts in a country town of the North. There are 1,700 so-called civil districts, containing on an average, four sub-districts. The law requires that the voters in the sub-districts shall choose three directors. One of these is to act as clerk, and the clerks of the several sub-districts, in a civil district, constitute its Board of Education. The Boards of Education in each county elect the county Superintendent. At the biennial election in August next, the legal voters of the State are to elect a State Superintendent, whose term of office is two years. That of county Superintendents is three years. The Governor, Secretary of State, Comptroller, and State Superintendent constitute "The Board of Commis-

sioners of the School Fund." It is provided that in order to put the law in operation, the Governor may appoint a State Superintendent, who may appoint the County Superintendents—all to serve until the time fixed for their election by the people. The State Superintendent is to spend at least ten days every year in each of the twelve judicial districts of the State, disburse the school fund, oversee the entire machinery of the system, and report annually to the Governor. The State Superintendent can give certificates to teachers, that shall be good anywhere in the State, and of perpetual validity; but he cannot select a uniform series of books for the State. This is wisely left to the counties. The scholastic population of the State is about 400,000; the available funds for the first year will be about $530,000. SOUTH CAROLINA.—The University of South Carolina consists of ten distinct and independent schools, into any three of which pupils are admitted without being required to take instruction in the other departments. The Schools of Law and Medicine are not yet organized. FREEDMEN'S SCHOOLS.—From the Report of Colored Schools in the Department of Washington for the month of February, 1867, it appears that the number of day and night schools in the District of Columbia is 90; number of teachers, white, 129; colored, 13; number of scholars, 4,822. In Alexandria City and County and Fairfax County, Va., the number of schools is 26; teachers, white, 29; colored, 6; scholars, 1,756. There are reported from Maryland six schools and 290 scholars. There are also in the District of Columbia, but not regularly reported, seven schools and 460 scholars. Total schools, 129; teachers, 191; scholars, 7,328.

GREAT BRITAIN.—In the House of Commons, March 12th, Mr. Ewart asked leave to introduce a bill to open the benefits of an education in the Universities to students without obliging them to be members of a college or hall, basing his motion on the example of foreign and Scotch Universities, and on the importance of diminishing the expense of university education. Mr. Beresford Hope objected to the scheme, but Sir William Heathcote, one of the members for the University of Oxford, said that the authorities at Oxford were now deliberating on the practicability of a scheme of this sort. Leave was given to bring in the bill.—On the 6th of Feb., in the same House, Mr. Lawson moved a measure to enable persons to enjoy the advantages of the schools of anatomy, botany, chemistry and medicine, in Trinity College, Dublin, irrespective of religious opinions.—An influential meeting has been held at Edinburgh, for the purpose of memorializing the Government in behalf of increased endowments for the Scotch Universities, and especially for the University of Edinburgh.—At the last Quarter Sessions for Surrey, the Chairman attributed the marked diminution of crime chiefly to the establishment of successful reformatory institutions. He said that 80 per cent. of the lads committed to these institutions came out well and prospered; only a very few relapsed into their old habits.—In Ireland there are 6370 national schools; a daily attendance of 320,000 pupils, and 900,000 names upon the books. There are besides, nine reformatory schools.

FRANCE.—An Educational Society, embracing the whole nation, is likely to be formed, unless the Government forbid. The subscription lists are well filled. The society has for its object the advancement of popular instruction.

SPAIN.—Out of 72,157 Municipal Councellors in Spain, 12,479 are unable to read or write. Among the number are included 422 Mayors, and 938 Deputy Mayors.

HINDOSTAN.—Bengal has 2,237 schools, with 103,000 pupils; there are besides 6,000 pupils in private schools. In Madras there are 1,000 schools, with 39,000 pupils. The number of girls' schools has greatly increased.

CHINA.—The *China Overland Mail*, of February 1st, says that the establishment of a college under the foreign professors who have come out with Mr. Hart, is looked upon with great interest, and it is generally believed, both among natives and Europeans, to be likely to have a very beneficial influence. The chief difficulty will consist in getting professors acquainted with the language, those who have come out being mostly beyond the age when a language so difficult as Chinese can be acquired. It is, however, hoped that the student interpreters in the service of the Customs will render much assistance in this respect, and that in the course of time the institution may be set into good working order.

CURRENT PUBLICATIONS.

IN his last work, Dr. Schele De Vere[1] gives, in a familiar way, "glimpses of the inner life of our language." He traces its relations to contemporary and ancient languages, showing the effect of the various invasions of Britain, and explaining why, though successful on the continent, the Latin never secured a permanent foothold on the island. The English tongue is a combination of all dialects: hardly a race exists which has not sent a tribute to this mighty idiom. The first result of this commingling was the formation of a jargon, which only in the fourteenth century assumed fixed form. Yet in a few generations this language became the first of all. "In wealth, wisdom, and strict economy," says Grimm, "none of the living languages can vie with it." As its title indicates, Dr. De Vere's work is a series of essays rather than a connected treatise. It contains valuable analyses of English sounds, of our orthography, and gossiping discussions respecting the origin of personal names and names of towns. The development of our language is well shown in the essays upon formation of nouns, pronouns and adjectives. In his investigations of adverbs and particles, Dr. De Vere exhibits some quiet humor, and renders the otherwise tedious argument exceedingly entertaining.

As a popular work, "Studies in English" is excelled by none in its department. As a scientific work, it will hardly take a high rank. The frequent occurrence of a light and even trifling style of discussion, though detracting little from its worth, will lessen its reputation and materially shorten its existence.

(1) STUDIES IN ENGLISH, or GLIMPSES OF THE INNER LIFE OF OUR LANGUAGE. By M. SCHELE DE VERE, LL.D. New York: Chas. Scribner & Co. 12mo. pp. 365. $2.50.

We thought, on seeing the title-page and the frontispiece of Col. Devoe's new volume,[2] that we had lighted upon the advertisement of some enterprising butcher. We were wrong. The book is an ingenious attempt to give a satisfactory answer to the unsatisfactory query, What shall we eat? The author, who prides himself upon wearing an honest white apron, describes every article of food sold in the markets of our leading cities. The book is not, however, a dry catalogue of names, uses, and modes of cooking. We find fish stories, bird stories, and hunting stories; amusing anecdotes, exposures of dishonest dealers, tricks of servants; analyses of game laws, obsolete enactments, scraps of history, origin of titles, in fact a thorough melange of useful and entertaining matter. It contains, also, sound advice to purchasers, and shows many ways of securing good meals at moderate cost. Though the language is not always the most fastidious, the style is so easy and lively, that the reader cannot fail to derive pleasure from its perusal.

To complete the series of text-books referred to in our April number, Prof. Warren has issued "General Problems of Shades and Shadows."[3] This work embraces fifty problems, and is divided into two books, on the construction of shades and shadows, and on their finished execution. Each book is subdivided into divisions and series; under each topic one representative problem is given, and a few special problems are scattered through the work. The latter are purposely few, as the author seeks to cultivate the thinking powers of the student, and to fit him for practice. These "Problems" are by no means elementary, and are useful only to those who, being already familiar with the rudiments of the subject, desire to become conversant with its details. This treatise has been conscientiously written. Much care has been bestowed upon the elucidation of general principles. The language is clear and well-chosen. The plates are fifteen in number, of large size and well executed.

The physician who can inform us how to keep the stomach in repair does well: he who tells us how to restore it to health when once disordered does better. Doctor Chambers has attempted the latter. In his work[4] on the Indigestions, he first describes the various kinds of stomachic disorders, and the causes producing them. He discusses the symptoms thoroughly, devoting a chapter to each. The last section treats especially of the nervous diseases connected with indigestion, and throws much light upon the pathology of many obscure nervous affections. The argument respecting the nature and treatment of indigestion, is fully illustrated by abstracts of cases occurring at the author's clinics and in his private practice. The pointed, pithy style and the thoroughly practical character of the work, recommend it to the attention of physicians. It is issued with all the neatness and accuracy for which Mr. Lea's publications are celebrated.

(2) The Market Assistant, a Brief Description of Every Article of Human Food sold in the Public Markets of New York, Boston, Philadelphia, and Brooklyn. By Thomas F. Devoe. New York: Hurd & Houghton. 12mo. pp. 455. $2.50.

(3) General Problems of Shades and Shadows. By S. Edward Warren, C.E. New York: John Wiley & Son. 8vo. pp. 140. $3.50.

(4) The Indigestions, or Diseases of the Digestive Organs Functionally Treated. By T. K. Chambers. Philadelphia: H. C. Lea. 8vo. pp. 287.

Believing that recitation of history by young pupils should be *verbatim*, Mr. Martindale has prepared for Common School use such a summary[5] of our country's history, as in his opinion may with profit be so learned and recited. He has given on a few small pages more, probably, than pupils would be likely to glean from a more pretentious volume; and in the hands of a teacher who will use it as a *text* book, in the proper sense of the term, clothing the dead skeleton of fact and incident given, with the life and substance of history, by oral teaching, the book will answer well the true purposes of a school book. Used, however, as the author seems to have intended, that is committed to memory verse by verse, and recited in answer to the questions at the foot of each page, its study will prove about as useful and wholesome as a feast of dry beans. Such a study of disconnected facts and dates, without regard to their relative bearing and importance, is of very doubtful utility, however important they may seem to those who fully comprehend their significance. The work has been compiled with considerable care, and the statements are rarely of doubtful accuracy. The chronological tables are good. The last giving the principal battles, where and when fought, the names of commanding officers, etc., will be frequently referred to, and very convenient. The closing is hardly satisfactory. The last important battle of the war was not fought at "Petersburgh, Va., April 1st, 1865."

American School Books so rarely merit commendation for excellence of typography or binding, that any exception deserves especial notice. The publishers of Chase & Stuart's Classical Series have set an example which we hope to see followed in all departments of school book publication. Their "Cæsar"[6] is a model text-book,—clear type, fine paper and printing, neat and tasteful binding, all given at a price that proves the common excuses for "cheap" work to be unfounded in necessity. The text is mainly that of Kraner, occasional preference being given to the readings of Oehler, Nipperday, and other distinguished editors.

The third Annual Report of the New Jersey State Geological Survey[7] has just been issued. It is chiefly a description of the marl beds of the State, and an inquiry into the value of marl as a fertilizer. This survey is one of the most economical on record. The expenses for 1866 were but $4,355.81, and the cost of the whole work is to be only $20,000. The final report will be rendered in April, 1868. The survey is prosecuted with ability under the excellent superintendence of Prof. Cook, of Rutgers College. The complete report promises to prove valuable and authoritative.

The American Journal of Science and Arts, for March, contains much interesting and valuable matter. The first article "On the Decrease of the rate of Increase of Population now obtaining in Europe and America," has attracted general attention. A short article "On the Subterranean sources of the Waters of the Great Lakes," from this number, is given on another page.

(5) A History of the United States. By Joseph C. Martindale, M. D. Phil.: Eldredge & Brother.

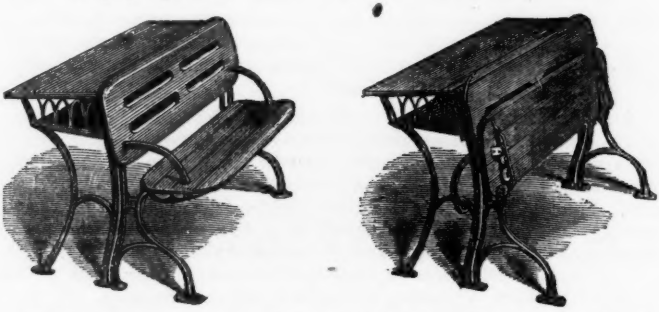
(6) Cæsar de Belle Gallico, with Notes, by Geo. Stuart, A. M. Phil.: Eldredge & Brother. Price $1.

(7) Third Annual Report of the Geological Survey of the State of New Jersey for 1866. Trenton. 8vo. pp. 27.

RECENT INVENTIONS FOR SCHOOLS.

The New American School Desk and Settee.

MAKERS of school furniture are slowly learning that the human body is not put together at right angles; and that school settees must at least make some show of adaptation to the persons of those who are to sit upon them. For some time gradual approaches have been making toward the proper curvature of seat and back: but it seems to have been left to the inventor of The New American School Desk and Settee* to hit upon the exact curve. Going back to nature, and taking for a guide the outline of the body when in proper sitting posture, he has devised a seat that supports the body as it should be supported, making the proper position the easiest position. It thus compels a natural, healthful, upright posture, without constraint or weariness.



The desk and settee are made to stand close together, as shown in the cut, yet do not touch each other. The advantages of a combination desk and seat are thus secured, with none of the disadvantages. Each part being distinct and self-supporting, it is impossible for a pupil to "joggle" the one before or behind him. The seat folds back to make room for passage, gymnastic exercises, sweeping, etc. The wood and iron are strongly dove-tailed to each other, making the desks very firm. With this peculiar attachment, warping or cracking of the wood is impossible, while the parts may be readily taken apart or put together by any inexperienced person. Six desks and settees when packed for shipping occupy only the space of one when set up. A decided advantage is thus gained in transportation, a large saving being effected both in bulk and in classification of freight. When boxed they are shipped as *ordinary* freight, at less than one-third the rate charged for furniture. The common sizes are: for Grammar Schools, 42x15 inches, two inches more in length than the customary allowance. For Primary Schools, 36x12 inches. Prices:—Grammar School, size, double desk, $4; Primary, $3.50; Settees for either size, for two pupils, $3.50.

*The New American School Desk and Settee, (Munger's Patent,) Manufactured by J. W. Schermerhorn & Co., New York. (Full descriptive Illustrated Circular sent on application.)

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Fig. 1 represents top view of cover; 2, top view of well without cover 3, bottom of cover; 4, edge of cover; 5, well complete; 6, key to cover. The Ink Well (5) is inserted into desk through hole bored for the purpose, so that the flange rests on surface of desk, and is secured in place by screws in countersunk holes. Flange of well has on its outer edge a lip, which alone rests on desk, leaving space within below interior part of flange. This space allows room in which pins projecting downward from lower side of cover may freely move. Pins have heads (as seen in 4), and are first inserted through apertures large enough to admit them freely in flange of well (as in 2). From these apertures extend, concentrically in opposite directions, curved slots, just wide enough to allow necks of pins to pass freely. Lower edges of these slots have slight inclination downward from apertures, so that as cover is turned the heads of pins become wedged against inclined surfaces, and draw cover closely upon well, on which it fits tightly. Cover is fastened by key (Fig. 6).

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THE good effect of an accurate register of deportment and scholarship in promoting a healthy spirit of emulation and scholarly pride, is acknowledged by all. Yet such a register is rarely kept. Teachers generally have not time to record each recitation as it occurs. Other duties crowd upon them so that the record must be neglected for the time, and afterwards made up from memory. Perfect accuracy being impossible in such cases, *confidence in the record is weakened, and its moral force, in a great degree, lost.*

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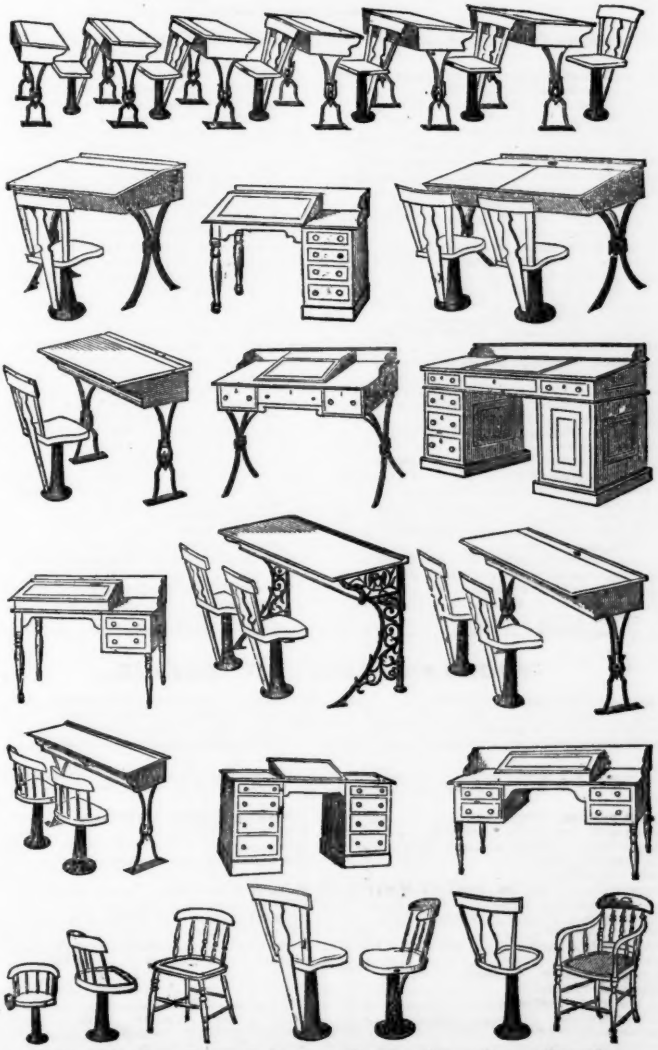

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